SRNL™
SAVANNAH RIVER NATIONAL LABORATORY
Operated by Savannah River Nuclear Solutions, LLC

We Put Science To Work

Savannah River National Laboratory Overview

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Deputy Laboratory Director and Chief Operating Officer

May 23, 2011

Citizens Advisory Board

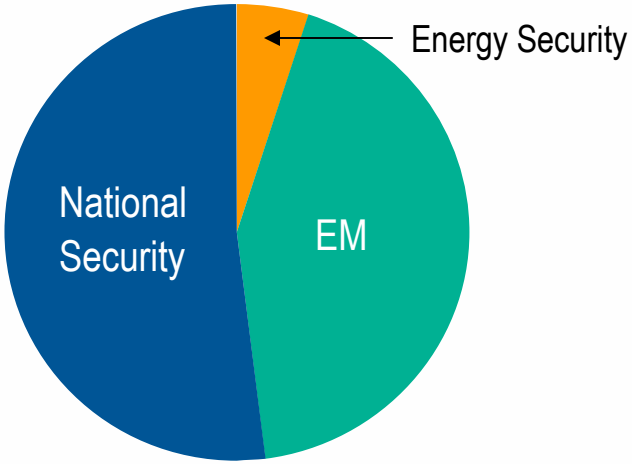
U.S. DEPARTMENT OF ENERGY | Office of Environmental Management

Savannah River NUCLEAR SOLUTIONS℠
FLUOR • NEWPORT NEWS NUCLEAR • HONEYWELL

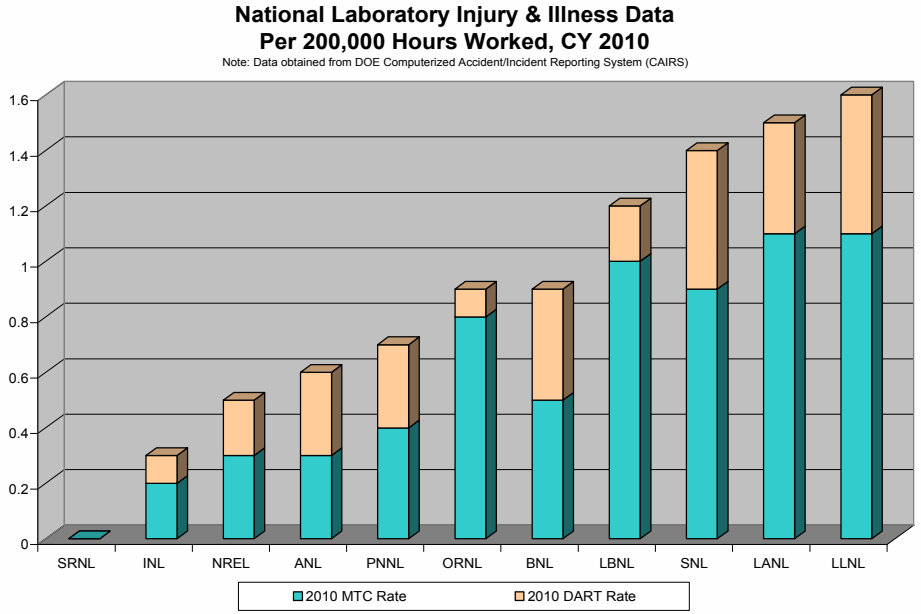
SRNL at a Glance

- **945 Staff; ~ $210M (FY10)**
- **Safest National Laboratory**
- **Broad Science and Engineering Capabilities**
  - Nuclear Materials Detection, Handling and Processing
  - Light Elements

Multi-Program Laboratory



SRNL FY10 Revenue



Evolution of SRNL

Savannah River Laboratory - established 1951

R&D to support the Savannah River Plant's mission of producing nuclear materials for the national defense

Savannah River Technology Center - 1992

Continued support to Savannah River Site (SRS)

Diversified technological focus

Savannah River National Laboratory - 2004

Expanded role for DOE/EM and broader national security missions

Our Facilities

Aiken County's Savannah River Research Campus

Our Greatest Strength: Our People

Internationally recognized ▪ Professional leadership ▪ Building the next generation





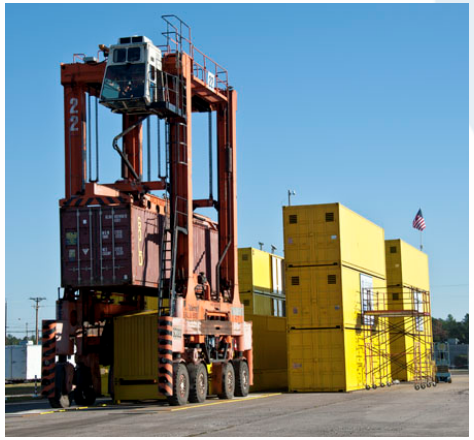




Multi-Program National Laboratory

Environmental Management

- Waste Treatment
- Materials Stabilization and Disposition
- Remediation and Cleanup
- Assessments and Verification



National and Homeland Security

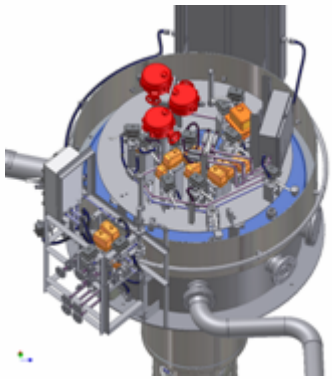
- Nuclear Defense
- Plutonium Technology
- Homeland Security
- Nonproliferation
- Nuclear Forensics

Energy Security

- Hydrogen Production and Storage
- Nuclear Fuel Cycle R&D
- Renewable Energy Research

SRNL Innovation Impacts Broad National Priorities

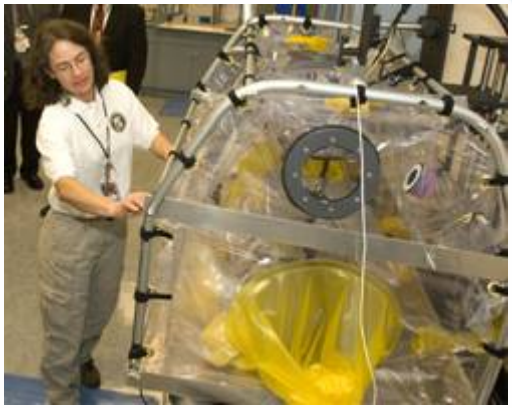
Environmental Management



Small Column Ion Exchange module

Rotary Microfilter

National and Homeland Security



FBI Forensics

Tracking and tagging technology

Energy Security

Porous wall hollow glass microspheres

Testing SODAR to measure off-shore wind

Environmental Management

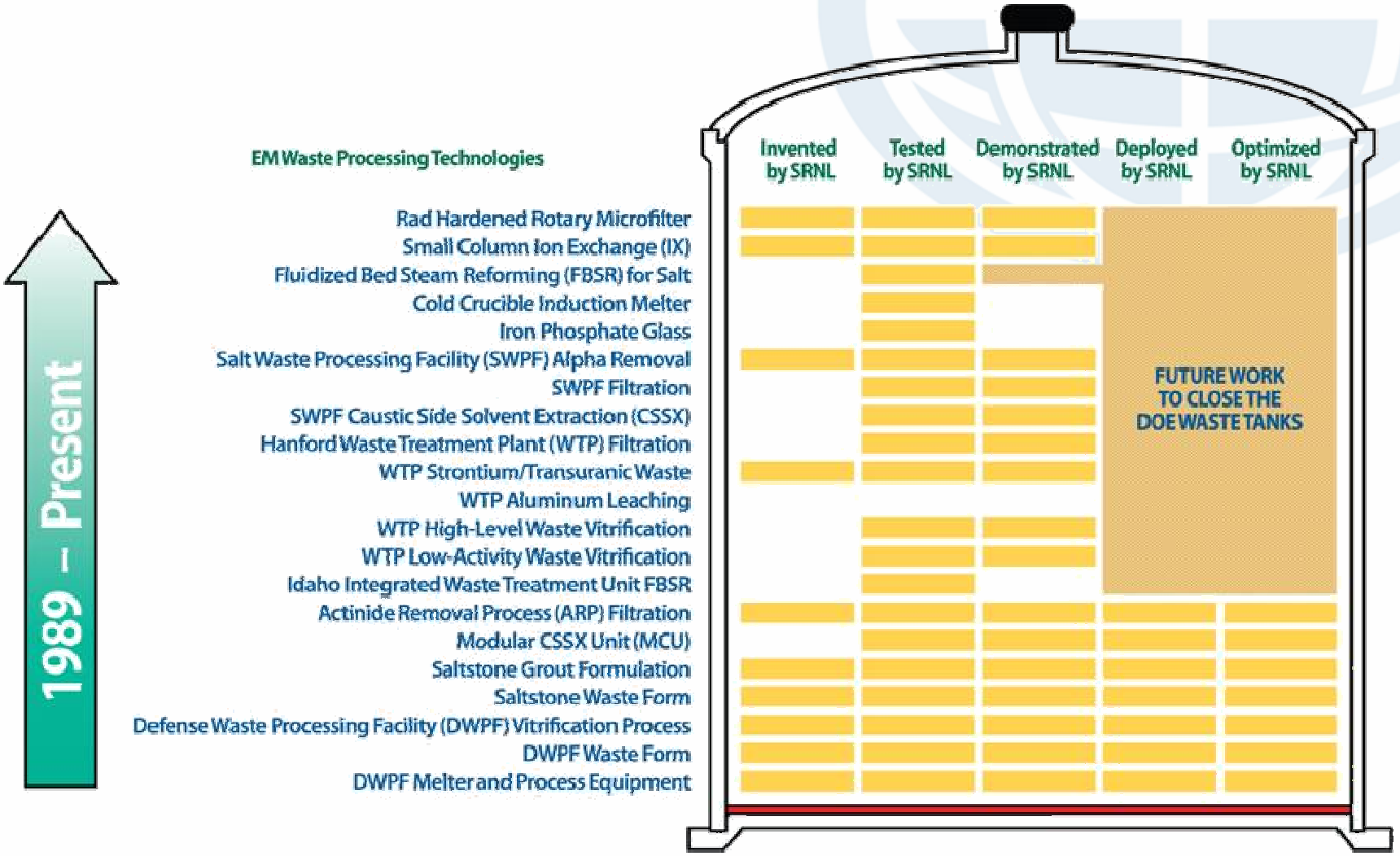
- Supporting EM on technologies to accelerate tanks closure and reduce lifecycle costs at SRS and Hanford:
  - Development and testing of small-column ion exchange technologies
  - Development of next-generation solvent and sorbent for SRS Modular Caustic Side Solvent Extraction Unit (MCU) and Salt Waste Processing Facility (SWPF) processes
  - Testing of fluidized-bed steam reforming process for low-activity waste
- Developed SRS process flowsheets for disposition of legacy nuclear materials

Environmental Management

- Led DOE-EM Tank Waste Research and Development Plan effort
- Providing support to EM Office of Technology Innovation and Development in organizing project reviews and conducting national-level technical exchanges
- Developed and started a Center for Applied Separations Science and Engineering, partnering with Georgia Tech, Vanderbilt, and Oak Ridge National Laboratory
- Memorandum of Agreement between SRNL and Chernobyl Center's International Radioecology Laboratory enables collaboration on radioecology research
- Established National Center for Radioecology to build pool of expertise for understanding potential environmental impacts

NCoRE
National Center for Radioecology
Managed by Savannah River National Laboratory

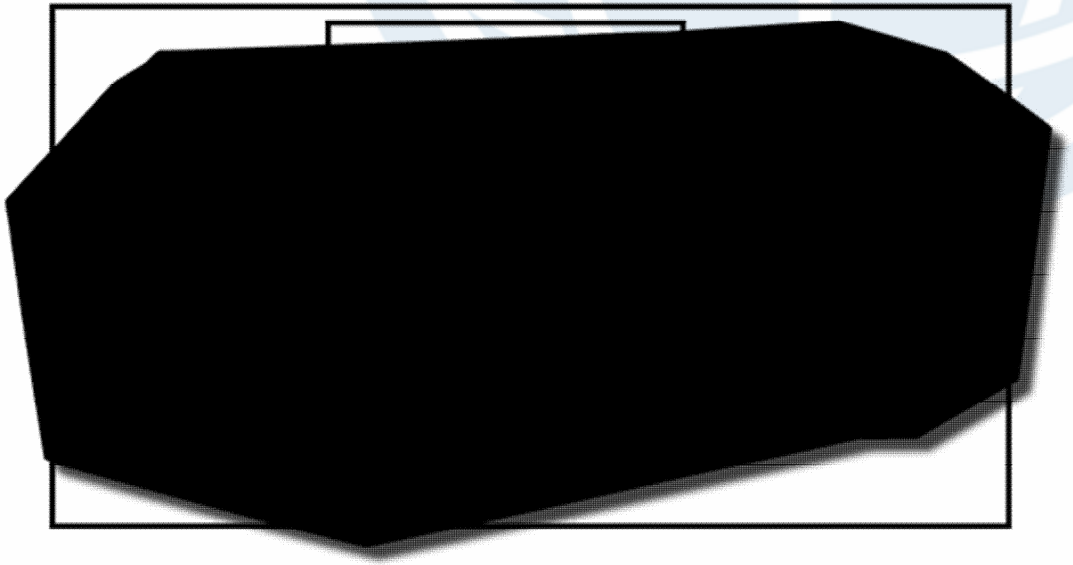
SRNL Innovation: EM Waste Processing Technologies



SRNL Innovation: EM Groundwater and Soil Technologies

Groundwater & Soil Cleanup Solutions

for every contaminant zone
matched to the cleanup challenge
applied across all remedial investigation phases
(characterization, remediation and monitoring)



SOURCE ZONE
- Raman Spectroscopy [2,3]
- Geo VIS [2,3]
- Cone Permeameter [1,2,3]
- Laser Induced Flourescence [2,3]
- Hydrophohic Flexible Membrane (FLUTe) [2,3]
- Ribbon NAPL Sampler [1,2,3]
- Wireline Soil Sampler [2,3]
- Membrane Interface Probe (MIP) [2,3]
- In-Situ Chemical Oxidation [2,3]
- Six Phase Heating (ERH) [2,3]
- Thermal Detritiation [2,3]
- Electrical Resistance Tomography (ERT) [2,3]

PRIMARY GROUNDWATER / VADOSE ZONE
- Cone Sipper [1,2,3]
- VOC Headspace Sampling [1,2,3]
- Strata Sampler [1,2,3]
- CPT NaI Gamma Probe [2,3]
- GeoSiphon [1,2,3]
- PHoSTer (bio) [1,2,3]
- Sulfate Reduction of Metals [2,3]
- Base Injection [2,3]
- Hydraulic Fracturing Enhanced SVE [2,3]
- Edible Oil Injection [1,2,3]
- I-129 Capture with AgCl [1,2]
- Micro CED (Bio) [1,2]
- Horizontal Wells [2,3]

DILUTE PLUME / FRINGE
- BaroBall [1,2,3]
- Microblower [1,2,3]
- Monitored Natural Attenuation (MNA) [1,2,3]
- Enhanced Attenuation (EA) [1,2,3]

Technology Key

Coding
[1] - Invented by SRNL
[2] - Tested/Demo by SRNL
[3] - Deployed/Optimized by SRNL

SRNL

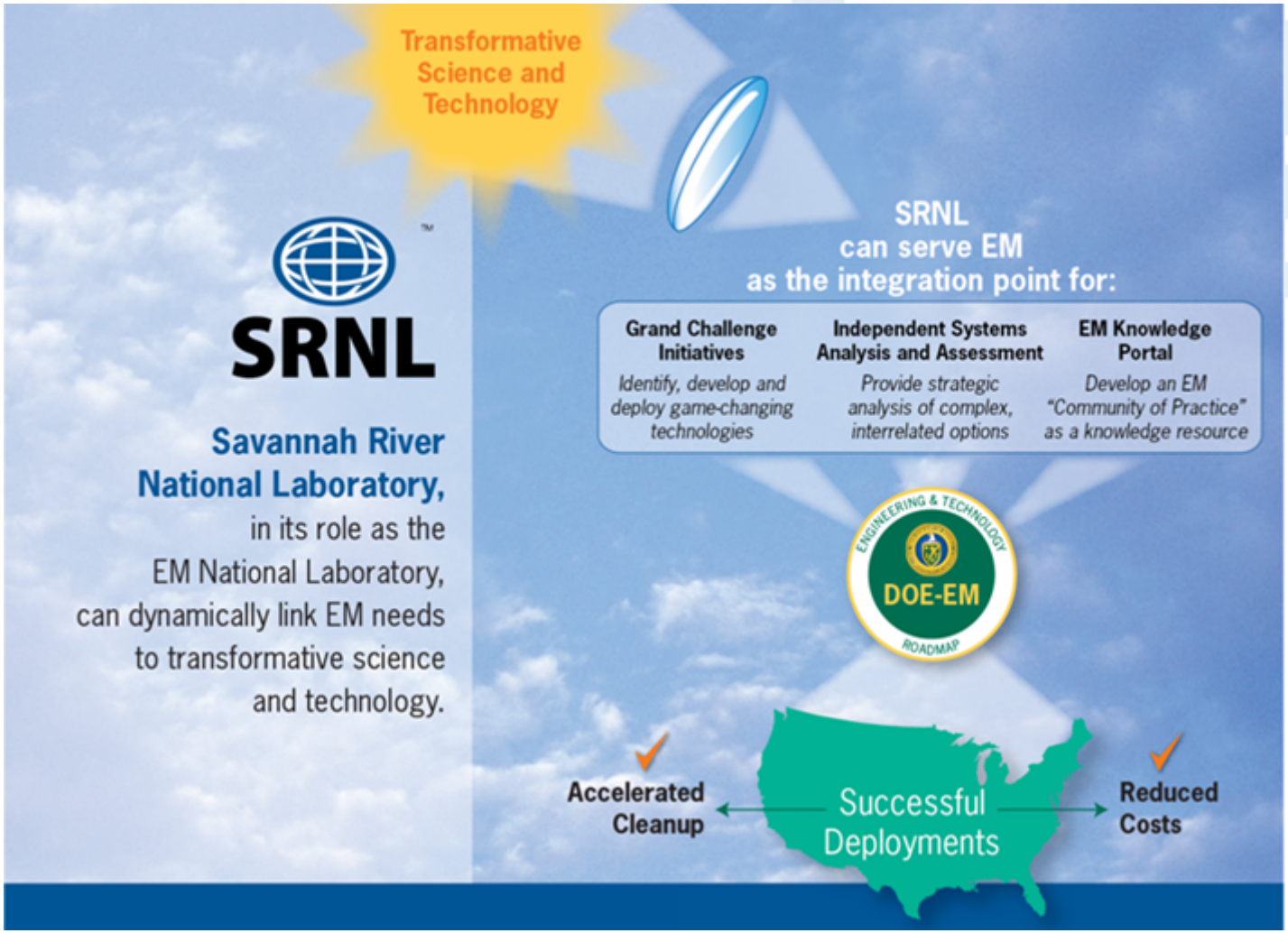
MicroCED

- **SRS: Demonstration in P Area**
- **Naturally occurring microbes**
- **Destroy chlorinated volatile organic contaminants**
- **Less expensive, less energy-intensive**
- **Patented microbial consortium**
  - Another SRNL microbial consortium for petroleum products
- **Demo funded by ARRA**

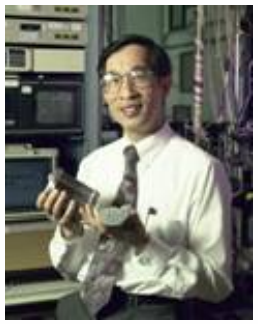
Unique Grout Formulations

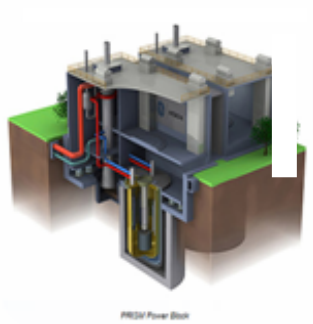
- SRS: In-situ D&D of reactor vessels
- Precedent-setting approach to D&D
- Chemically compatible with subject materials
- Flowable and self-leveling
- Funded by ARRA
- Building on this work, developing grout for high-level waste tank closure
  - Funded by Site's liquid waste contractor, Savannah River Remediation

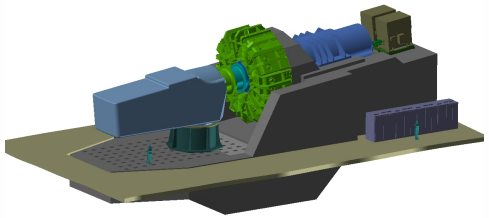
Moving to Strategic Role for EM Program



Current and Future Energy Security Initiatives

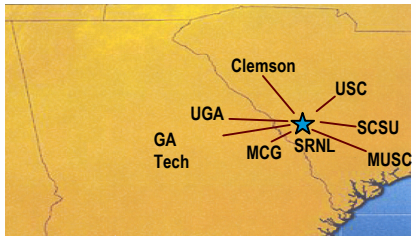






- Hydrogen
- Bio-Energy Research
- Offshore Wind and Data Assessment
- Batteries and Energy Storage
- Small Modular Reactors
- Grid Integrated Renewable Projects
- Fuel Cycle R&D
- Carbon Management

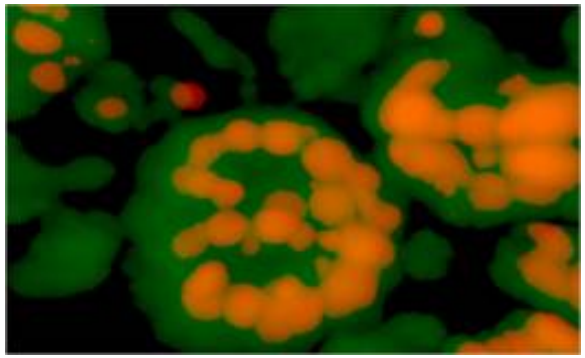
Hydrogen



- Center for Hydrogen Research (+60,000 sf facility, 22 custom labs)
- Hydrogen Storage Engineering Center of Excellence
- Industry and University partnerships
- South Carolina Hydrogen and Fuel Cell Alliance
- Hydrogen storage materials
- Hydrogen fueling capability
- Hydrogen production
- Regenerative fuel cell for backup power
- Hydrogen effect on materials Codes and Standards

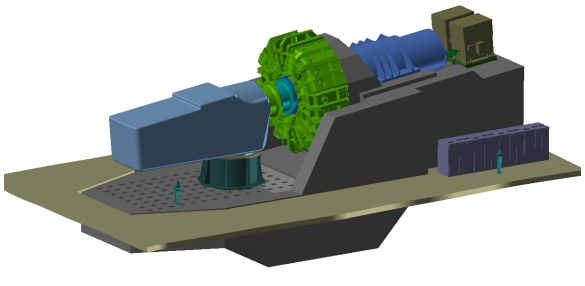
Bio-energy

- South Carolina Bio-Energy Research Collaborative
  - SRNL, Clemson, South Carolina State University
  - Goal is to convert cellulose from indigenous crops (switch grass, sorghum and pines) to liquid fuel and other high value products



- Algae Research
  - Focused on improving the sustainability and safety of algae-based fuels and products
  - Partners include DOE EERE, Texas A&M, NOAA Hollings Marine Lab

Wind Energy



- **Sodar**
  - South Carolina Consortium for Offshore Wind
  - Partners: Clemson University, Santee Cooper, Coastal Carolina University, Second Wind, CMMC, the Center for Hydrogen Research, U.S. Coast Guard and Fluor
  - Sodar deployed on offshore platform to evaluate as a tool for measuring offshore wind potential

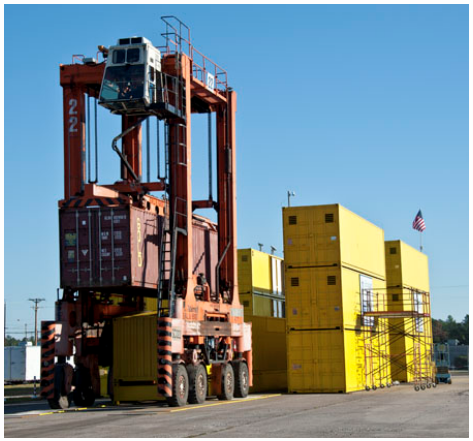
- **Large Wind Turbine Testing Facility**
  - $98M project at Clemson University Restoration Institute
  - World's largest wind drive train test facility
  - SRNL role: secure data acquisition system

Carbon Management

- Completed establishment of a Carbon Flux Supersite at SRS to monitor and support research on CO_2 exchange in the terrestrial ecosystem

National and Homeland Security

- Expanded FBI Forensic Laboratory at SRNL to perform traditional forensics on radiologically contaminated evidence
- Accreditation renewed for SRNL Nuclear Forensics Analysis Center
- Integrating and testing rad monitors for port cargo containers for DNDO



SRNL Nuclear Knowledge: Key to Our Nation's Future